

AIDS Brief

for sectoral planners
and managers

Sports Sector



The HIV/AIDS epidemic is a global crisis, which demands urgent attention and committed, sustained action by alliances of individuals, organisations and sectors. The AIDS Brief series has been developed to support the conceptualisation and implementation of key sectoral responses. Participation in recreational and competitive sports, as well as occupational physical activity, presents the individual with HIV disease with unique health challenges, and raises questions about the health risk to co-participants in team and contact sports. On the other hand, the sports sector offers almost unlimited opportunities to access and involve young people, even those who are outside the school system, and this means that the sector can contribute significantly to any country's efforts to address the epidemic.

BACKGROUND

Definition of the Sports Sector

For the purpose of this Brief the focus is on recreational physical activity and competitive sports, but the broad comments also pertain to occupational physical activity i.e. exercise related to work. The sports and physical activity sector can be defined as that sector of the population that is exposed to regular physical activity including occupational physical activity, and individuals who participate in recreational physical activity or competitive sports at any level (schools, clubs, provincial, national and international).

Facts about the Sports Sector

The health benefits of regular participation in physical activity are well established. Regular physical exercise is an essential component of a healthy

lifestyle. Public awareness about the health benefits of regular exercise has resulted in an increase in the number of participants in all types of sport (contact and non-contact sport). Worldwide the most

popular sports are football and athletics. In addition, there is now recognition of the importance of understanding how exercise at work relates to production and to overall employee health.

AIDS AND THE SPORTS SECTOR

The acquired immune deficiency syndrome (AIDS) was first recognised as a clinical entity by the Centers for Disease Control (CDC) in 1981, with the description of 5 cases of *Pneumocystis carinii* infection and 26 cases of Kaposi's sarcoma in homosexual males. The transmission, clinical features, epidemiology, serology, and mortality associated with human immuno-deficiency virus (HIV) infection have been well described. Although there is considerable debate on the precise impact of the HIV epidemic on any society, it seems certain that this disease will have a considerable effect on the health of populations, including the sporting population. The association between physical activity and HIV infection can therefore not be ignored. Specific issues that need to be considered are the risk of HIV transmission during sports participation, the effect of HIV



infection on sports performance, and the effects of regular physical activity on the clinical outcome of HIV infection.

What is the risk of HIV transmission during sports participation?

Since its discovery in 1983, the human immuno-deficiency virus (HIV) has been isolated in blood, semen, cervical secretions, lymphocytes, serum, plasma, cerebrospinal fluid, tears, saliva, urine, breast-milk and alveolar fluid of infected subjects. However, the transmission of the virus from one individual to another has been linked directly only to blood, semen, cervical secretions and breast-milk. The primary routes of transmission are therefore by sexual contact with an infected person, parenteral exposure to infected blood or blood products, and perinatally from an infected mother to her child.

Prior to 1989, there has been no documentation of HIV infection occurring as a result of participation in sports. However, the theoretical possibility of HIV transmission

through open bleeding wounds in contact sports has been recognised by sports physicians. The first case of possible HIV transmission as a result of sports participation was published in 1990. This involved an Italian soccer player in whom HIV seroconversion was documented weeks after a traumatic incident during a soccer match. During the soccer match the player collided with another player who was later documented as being HIV seropositive. Both players sustained open bleeding wounds resulting in possible mixing of blood. There was no indication that the player may have been infected through any other route of HIV transmission. The authors concluded that this was the first case of HIV transmission that occurred directly as a result of sports participation. Although this case report has been criticised on epidemiological grounds, it nevertheless has clear implications for the risk of HIV transmission during sports participation. In particular, those people who participate in contact sports such as boxing, wrestling, rugby and soccer are potentially at risk.

It must be emphasised that to date no cases of HIV transmission have been recorded in either the sporting or the non-sporting population through contact with saliva, social contact, or sharing facilities such as living space, toilets, bathrooms, eating and cooking facilities. It must also be borne in mind that the risk of HIV infection in sports people is the same as that in the general population if there is a history of engaging in well-established high risk behaviours for HIV transmission.

Although there is documentation of only a single possible case of HIV disease as a result of participation in contact sports, there is a need to establish clear guidelines for the prevention of HIV transmission during sports participation. As early as 1989, the International Sports Medicine Federation (FIMS), together with the World Health Organisation, published guidelines for the prevention of HIV transmission during contact sport (WHO position statement 1989). Subsequently, other organisations such as the Australian Sports Medicine Federation, the American Academy of Paediatrics, and most recently, the National Football League in the USA have published similar guidelines. In South Africa, to date, the South African Football Medical Association (SAFMA), the South African Rugby Football Union (SARFU), and most recently, jointly, the Department of Sport, the South African Sports Medicine Association (SASMA) and the Department of Health have published official position statements on HIV disease in sport.

The question that is foremost in the minds of sports administrators and participants is what is the risk of HIV transmission in sport? In answer to this, there are no epidemiological data available to date to calculate the risk of HIV transmission during sports participation. At best, a theoretical risk of transmission in a sport can be calculated by considering the following

variables:

- the estimated prevalence of HIV among sports participants (% participants that are HIV positive)
- the estimated chance of an open bleeding wound in a sports participant (incidence of open bleeding wounds)
- the estimated chance of two players with open bleeding wounds making contact that could result in blood to abrasion or blood to mucous membrane exposure (incidence of physical contact between two participants)
- the estimated chance of transmission of the virus when infected blood makes contact with an open bleeding wound (estimated to be 0.3-0.5%, which is similar to that calculated for a needlestick injury)

If all the above data are available for a particular sport, the estimated risk of HIV transmission can be calculated using the following formula:

Risk = Seroprevalence of HIV (%) X Risk of open bleeding wound (%) X Risk of contact with a bleeding player (%) X 0.03 (Estimated to be similar to the risk of seroconversion after a needlestick injury).

At present, accurate data are available only for American football and professional boxers in South Africa. In American football the risk of HIV transmission in a game has been calculated as 0.000000104. This can be translated to approximately one player becoming infected per 100 million games. Clearly this is a very low risk, and is probably the reason why there is no widespread documentation of HIV infection in American football players.

However, it must be pointed out that the seroprevalence in American football players was estimated to be 0.5%, and that both the risk of an open bleeding wound (0.9%) and the risk of contact between players (7.7%) were low. These estimates will differ between different populations (higher seroprevalence) and sports (higher risks of bleeding and player contact).

For instance, in a boxing match of 12 rounds, the risk of an open bleeding wound has recently been documented as 47%. The prevalence of HIV disease in one study of 952 boxers in South Africa was determined as 9%, and the risk of contact between boxers during a fight is 100%. The risk of seroconversion in professional South African boxers has been calculated as 0.00021 or 1 in 4760 fights. This is considerably higher than the calculated risk in American football. The risk of seroconversion after contact between two boxers may also be higher than that of a needlestick injury for at least two reasons. Blood may be forced into the wound by the nature of the blow, and contact may be repetitive.

Despite the lack of accurate scientific data in other contact sports, the prevention of HIV disease in sports people has to be addressed by establishing clear guidelines for sports participants, administrators and medical personnel involved in sport.

What are the effects of HIV infection on exercise performance?

The HIV epidemic will inevitably affect physically active people. This would include people who are physically active in sports (recreational or competitive). Two of the questions that will arise as a result of HIV infection in physically active individuals are

- i) whether HIV disease affects the individual's ability to perform physical *exercise*, and
- ii) whether regular physical *exercise* has a beneficial or perhaps a detrimental effect on the outcome of the disease. These two questions have important implications for the sports person.

For the purposes of discussing these two questions, HIV disease can be classified into 3 stages. Stage I represents the asymptomatic HIV positive patient, whereas Stage II is the early symptomatic HIV positive patient, and Stage III the patient with 'full-blown' AIDS.

There is very little information available in medical literature on the effect of HIV infection on the ability to perform physical *exercise*. Indeed to date, only a few studies have addressed this issue. In one study exercise performance was investigated in 32 patients with a clinical diagnosis of AIDS. Patients with documented AIDS, complaining of dyspnoea on exertion, but with no pre-existing pulmonary disease or other significant complicating medical disorders, were enrolled in the study and their exercise performance was compared to a group of age, height and weight matched normal subjects.

The exercise test to which patients and control subjects were subjected consisted of an incremental exercise test to exhaustion, during which cardiorespiratory variables were measured. Arterial oxygen saturation was measured by finger oximetry. Spirometry was done before and immediately after the exercise test. The results of this study were that the patients with documented AIDS exercised to a significantly lower workload than controls, had a lower maximum oxygen uptake (VO₂ max) than controls (not statistically significant), had similar maximal heart rates as controls, had a lower "ventilatory anaerobic threshold" than controls, and did not have bronchospasm post-exercise. The authors concluded that some AIDS patients have impaired exercise performance and this was attributed to a central (cardiac) limitation.

In another study exercise testing was included as part of a clinical trial evaluating the effectiveness of corticosteroids on *Pneumocystis carinii* pneumonia in AIDS patients. In this study AIDS patients with *Pneumocystis pneumonia* were randomly allocated to either an experimental (receiving corticosteroids) or a control (receiving placebo) group and then monitored for 4 weeks. The results indicated that physical work is severely impaired in AIDS patients with associated *Pneumocystis* infection and that this can be improved by appropriate therapy.

The effects of regular exercise training on patients who were seropositive for HIV but who were

otherwise asymptomatic have also been documented. In one study 45 male volunteers were allocated randomly to an exercise and a counselling group. The groups were well matched according to modified Walter Reed criteria. The patients in the training group underwent exercise training consisting of cycling, weight-training and flexibility exercises for 12 weeks. Exercise testing and immunological parameters were assessed before and after the training period. One of the significant findings of the study was that the training group showed evidence of adaptation to exercise. This study therefore indicated that 12 weeks exercise training in HIV seropositive patients can result in improved physical work capacity.

In summary, patients with AIDS appear to have impaired physical exercise capacity, the precise mechanism of which is not clear. Asymptomatic patients with HIV disease appear to respond well to exercise training.

Are there any beneficial or detrimental effects of regular physical activity on the outcome of HIV infection?

It is well recognised that an acute bout of physical exercise, as well as exercise training, has significant but variable effects on a number of immunological parameters. An acute bout of exercise will result in a leucocytosis, the magnitude of which is related to the intensity of exercise, the duration of exercise and the state of exercise training of the athlete. The nature of the leucocytosis is variable and can either be a predominant neutrophilia or a predominant

lymphocytosis. Furthermore, changes in lymphocyte subsets can also occur in response to an acute bout of exercise. It has been documented that there is an increase in the absolute cell numbers of all lymphocyte subsets, but that the increase is greater in B cells compared to T cell subsets, thereby decreasing the T cell to B cell ratio. It has also been demonstrated that a greater increase occurs in T8 compared to T4 cells during exercise, thereby decreasing the T4/T8 ratio. In addition, total lymphocyte proliferation to antigens and mitogens is typically reduced in response to exercise.

The response of T lymphocytes to an acute bout of exercise has clear implications for individuals infected by HIV. Of particular importance are the effect of exercise and exercise training on T cell counts and the CD4/CD8 ratio. To date there are no published studies on the possible association between a programme of regular physical activity and the long term clinical outcome of HIV infection. However, it has been suggested by long term survivors that regular exercise contributed to their longevity.

In recent years, several groups of investigators have been concerned with and have published data on the effects of exercise on the clinical course of HIV infected individuals. In one of the earliest reports, from the University of Miami, the beneficial effects of regular exercise training on CD4 cells of HIV-infected individuals has been documented. In this study, 10 weeks of exercise training at moderate intensity (<80% of maximal heart rate), for 45 minutes three times

a week resulted in an increase in CD4 cells. In another aspect of the study, high risk individuals, who were regular exercisers, showed less anxiety and depression after receiving the news that they were HIV seropositive. Exercise appeared to provide a "buffer" to the psychological sequelae of a powerful acute stressor in these patients. Recently, the beneficial effects of exercise training for HIV positive patients (Stages I to III) have been summarised as follows:

What are the effects of exercise training in HIV positive individuals?

Stage I

- Increased CD4 cells
- Possible delay in onset of symptoms
- Increase in muscle function and size

Stage II

- Increase in CD4 cells (lesser magnitude of change)
- Possible diminished severity and frequency of some symptoms

Stage III

- Effects on CD4 cells are not known
- Effects on symptoms are inconclusive

These findings have the following possible practical applications:

- i) that exercise can play a beneficial role in the pre-HIV test counselling of potentially infected patients, and
- ii) that regular, moderate intensity exercise can play a role in the management of early, asymptomatic individuals with HIV infection.

IMPACT CHECKLIST

Internal risk profile

Are sports participants:

- well educated with respect to HIV disease and its impact?
- at risk of acquiring HIV disease through their participation sports?
- with HIV disease at risk of altering the clinical course of their disease negatively?

- Are sports participants who are on international tours or at training camps at high risk of exposure to HIV disease through casual sexual contact?
- Can sports administrators assess the risk of HIV transmission through sports participation?
- Are there sports that have a higher risk of potential HIV transmission than others?

- Are there any benefits of regular sports participation for the individual with HIV disease?

External risk profile

- Does the sports participant contribute to the spread of HIV disease?
- Do sports participants engage in high risk sexual behaviour?

SECTORAL RESPONSE

Guidelines for the prevention of HIV transmission in sports

The following general guidelines are suggested to reduce the risk of transmission of HIV in sport:

- In general the risk of HIV transmission as a result of sports participation is very low.
- The risk is higher in contact sports where there is a possibility of transmission through contamination of open lesions, wounds or mucous membranes of a non-infected individual with infected blood or blood products.
- At present there is no risk of transmission from saliva, sweat, tears, urine, respiratory droplets, hand-shaking, swimming pool water, communal bath water, toilets, food or drinking water.

The following are specific guidelines for the individual sports person to reduce the risk of HIV transmission during sports:

- A sports person who engages in high risk behaviour is advised to seek medical attention regarding possible HIV infection.
- Sports persons with known HIV infection should seek medical and legal counselling before considering further participation in sport, in order to assess risks to their own health as well as the theoretical risk of HIV transmission to other sports people.
- Sports people with known HIV infection should inform medical personnel of their condition if they sustain an open wound or skin lesions during sports participation, so that these can be managed appropriately.

Specific guidelines for sports administrators:

- Sports administrators, including coaches and managers, have special opportunities for meaningful education of sports people with respect to HIV disease.
- They should encourage sports people to seek medical counselling where appropriate.
- They also have an important role in ensuring that adequate medical care is available for their sports people.

Guidelines for medical personnel in preventing HIV disease in sports people are:

- In general the guidelines for management of HIV positive patients that have been published in documents such as the policy statement by the College of Medicine of South Africa can be applied by medical

personnel who attend to sports people with suspected HIV disease.

- All open skin lesions sustained during sports participation should be treated appropriately before allowing the sports person to return to the playing field.
- The following treatment of open skin lesions is recommended:
 - ✓ immediate cleaning of the wound with a suitable antiseptic such as hypochloride (bleach, Milton), 2% glutaraldehyde (Cidex), organic iodines or 70% alcohol (ethyl alcohol, isopropyl alcohol)
 - ✓ the open wound should be covered securely prior to returning to the playing field, so that there is no risk of exposure to blood or blood products
 - ✓ that all first aiders and medical personnel attending to sports people with open wound lesions wear protective gloves to decrease the risk of HIV transmission to themselves and other sports persons.

Recommendations for sports and physical exercise in patients with HIV infection:

- Before initiating any type of exercise training, all HIV infected individuals regardless of age or stage of disease should:
 - ✓ have a complete physical examination
 - ✓ discuss exercise plans with a physician or exercise specialist
 - ✓ comply with ACSM testing and prescription guidelines
- Healthy asymptomatic HIV seropositive:
 - ✓ Unrestricted exercise activity
 - ✓ Continue competition
 - ✓ Avoid overtraining
- AIDS-related complex:
 - ✓ Continue exercise training on symptom limited basis
 - ✓ Avoid strenuous exercise
 - ✓ Reduce or curtail exercise during acute illness
- Diagnosed AIDS:
 - ✓ Remain physically active
 - ✓ Continue exercise training on symptom limited

basis

- ✓ Avoid strenuous exercise
- ✓ Reduce or curtail exercise during acute illness.

What role can the sports and physical activity sector play in a country's HIV/AIDS response?

- **Sport development**
Sport development programmes offer unique opportunities for meaningful education on HIV and AIDS. This is ideal, as the target groups are similar.
- **Sports persons as role models**
Prominent role models in sport can play an important part in educating the youth in a country.
- **Sporting events**
Sporting events draw or are viewed by thousands, or even millions of people. These events can be useful vehicles for raising awareness about AIDS and disseminating key messages.

ACTION CHECKLIST

- ✓ Define and calculate the risk of HIV transmission in sport
- ✓ Develop specific HIV policies in each sport based on the general guidelines

- for prevention of HIV transmission
- ✓ Launch an educational campaign within the sports code or sports organisation

- ✓ Encourage medically directed physical exercise programmes for patients suffering from HIV disease

SUMMARY

At the individual level, regular participation in physical activity is advocated as an important preventative health measure. However, the global pandemic of HIV infection is likely to influence physically active individuals. The

association between HIV infection and physical activity therefore requires attention, namely the risk of HIV transmission during sport and physical activity, the effects of HIV infection on exercise performance, and the effects of regular physical activity on the

outcome of HIV infection.

At the macro-level, the potential of the sector to contribute to a multisectoral response to the epidemic lies in its ability to access and influence large sections of the population, particularly the youth.

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- Department of Health and Human Services Consensus Guidelines: <http://hiv.medscape.com/Home/Topics/AIDS/AIDS.html>
- University of California, San Francisco Online Textbook on HIV: <http://hivinsite.ucsf.edu/akb/1997/04arvrx/index.html>

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